REMARKS

Status of the Claims

Claims 1-21 were rejected. Claims 1-21 remain pending.

Claims 1, 2, 6, 10, 11, and 12 have been amended. Claims 1, 6, and 12 have been amended to remove reference to SEQ ID NOS:3, 4, 11 and 12. Claims 1, 6, and 12, part (e) have been amended to recite specific hybridization conditions. Support for this amendment can be found, for example, on page 11, lines 11-13. Claims 1, 6, and 12 were amended to recite "Blast resistance." Support for this amendment can be found, for example, on page 42, line 21 and Example 14 of the specification. Claim 6 was amended to more clearly define the claimed invention. Support for the amendment to claim 6 can be found, for example, on page 2, lines 26-31. Claim 2 was amended to have proper antecedent basis. No new matter has been entered by way of these amendments. Applicants reserve the right to pursue the cancelled subject matter in a divisional or continuation application.

The Objection to the Specification Should Be Withdrawn

The specification was objected to for not complying with the sequence listing requirements. Figure legend 5, on page 3, lines 28-30 has been amended to recite the appropriate SEQ ID NO. In addition, Figure 5 contains the amino acid sequence of Pib. The Pib sequence has been added to the sequence listing as SEQ ID NO:17. The specification has also been amended to provide SEQ ID NOS for the primer sequence appearing in Tables 1-3. These sequences have been added to the sequence listing as SEQ ID NOS:18-43.

No new matter has been added by way of this addition. The sequence listing and specification are now in compliance with 37 CFR 1.821-1.825 and the objection should be withdrawn.

The specification was objected to for containing hyperlinks. The hyperlink has been removed, and the objection should be withdrawn.

The Rejection of the Claims Under 35 U.S.C. §112, First Paragraph, Should Be Withdrawn

Enablement

Claims 1-21 were rejected under 35 U.S.C. §112, first paragraph, for lack of enablement. This rejection is respectfully traversed.

The Examiner asserts that no guidance has been provided for the production of transgenic plants having resistance against all diseases using the claimed sequences of the invention. This rejection is respectfully traversed. However, to expedite prosecution, the claims have been amended to recite that "Blast resistance" is conferred to the plant. As amended, the claims are enabled under 35 U.S.C. §112, first paragraph.

The Examiner further acknowledges that the specification is enabling for the polynucleotides having the nucleotide sequence disclosed in the sequence listing, but takes the position that insufficient guidance is provided for one of ordinary skill in the art to make nucleotide sequence variants having a range of 95% sequence identity with the nucleotide sequence of SEQ ID NO:7; variants that hybridize under stringent conditions to SEQ ID NO:7; and, fragments that encode at least 40 amino acids of SEQ ID NO:8, with a reasonable expectation of success and without undue experimentation. The Office Action further states that while mutagenesis techniques are known, it is not routine in the art to screen for multiple substitutions or multiple modifications as encompassed by the instant claims. The Action states, "One of skill in the art would have to make all possible nucleotide substitutions and deletions in the 3000 nucleotide long sequence of SEQ ID NO:7 or 11 and test all nucleotide sequences that meet the structural limitation to determine which one meets the functional limitations." (page 6, paragraph 2 of the March 11, 2005 Office Action). Thus, the Examiner is suggesting that in order to satisfy the enablement requirement, the Applicant must teach each nucleic acid substitution or deletion that may be made to produce a functional Pi2-like variant, such that no experimentation would be required to identify such variants. According to the applicable case law, however, the test of enablement is not whether experimentation is necessary to make and use an invention, but rather if experimentation is necessary, whether it is undue. *In re Angstadt*,

198 USPQ 214, 219 (C.C.P.A. 1976). The test of whether an invention requires undue experimentation is not based on a single factor, but rather a conclusion reached by weighing many factors. *In re Wands*, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988).

Factors to be considered in determining whether undue experimentation is required include the quantity of experimentation necessary, the amount of guidance provided in the specification, the presence of working examples of the invention in the application, the nature of the invention, the state of the prior art, the relative skill of those in the art, the predictability in the art, and the breadth of the claimed invention (*In re Wands*, 8 USPQ2d at 1404). Accordingly, the holding of *Wands* does not require that an applicant identify every functional variant as argued by the Examiner. Rather, *Wands* sets out factors to be considered in determining whether undue experimentation is required to make and use the claimed functional variants.

The specification provides guidance for determining the regions of the Pi2-like sequence that would tolerate modification. Applicant has provided the sequence of the claimed Pi2-like sequences, SEQ ID NO:7. The nucleotide sequences of claims 1, 6, and 12 parts (c), (d) and (e) vary from this sequence by structural parameters that are defined in the specification. For example, guidance for determining percent sequence identity is provided in the specification (see page 6, lines 12-25 and pages 19-22). Guidance regarding hybridization conditions is provided on pages 10-11, and guidance regarding fragments is provided on page 5, lines 10-31 and page 6, lines 1-11. Further, the specification discloses in Figure 5 an alignment of the Pib gene known to confer disease resistance with the Pib2-like sequences of SEQ ID NO:8 (NBS4). As outlined on page 34, lines 16-19, the Pib gene contains various conserved domains, including a nucleotide binding site (NBS) and a leucine rich region. To assist the Examiner, Appendix A provides the amino acid sequence of SEQ ID NO:7 and illustrates the conserved LLR repeats and the NBS domain. The specification also teaches methods for determining additional residues that are essential for function, including site-directed mutagenesis (page 6, lines 12-25). Finally, guidance regarding assaying for Blast disease resistance activity is found on pages 12, lines 18-21 and Example 14. Accordingly, one of skill in the art would be able to determine the functionality of claimed variants. Based on the teachings regarding the functional domains of

Pi2-like sequences, a skilled artisan could choose among possible modifications to produce sequences within the structural parameters set forth in the claims and test these modified variants to determine if they retain the ability to confer Blast disease resistance. Making and testing such variants is routine to those of skill in the art.

Accordingly, when all of the *Wands* factors are considered together, it is clear that although some quantity of experimentation would be required to produce functional Pi2-like variants, the level of experimentation would not be undue in view of the state of the prior art (where the functional domains of Pi2-like sequences have been described), the relative skill of those in the art (to whom the making and testing of variants is routine), the predictability in the art, the amount of direction provided in the specification (which provides guidance for substitutions and describes assays for identifying functional variants), and the breadth of the claimed invention (for which the scope is defined by structural limitations). Thus, a rational scheme for determining the regions of the recited Pib2-like polynucleotides (SEQ ID NO:7) that would tolerate modification is provided. These factors all favor a conclusion that one of skill in the art could practice the claimed invention without undue experimentation.

It is further noted that the Examiner makes a broad general statement regarding the unpredictability of the state of the art, but fails to provide any evidence to establish this position. As discussed throughout this response, the state of the art allows for the routine identification of variants within the defined structural parameters recited in the instant claims. If the rejection is maintained, the Examiner is respectfully requested to provide evidence supporting the position.

Applicants note that the claims in this case are similar to those at issue in the Board of Patent Appeals and Interferences decisions in *Ex Parte Sun*, 2003-1993 (Bd. Pat. App. Int., Jan. 20, 2004) and *Ex Parte* Vogelstein, 2002-0779 (Bd. Pat. App. Int., Dec. 30, 2002). For the convenience of the Examiner, copies of the Board's decisions in these cases are provided with the present response as Appendices B and C, respectively.

In *Ex parte Sun*, the Examiner had rejected claims directed to sequences having 80% identity with a novel maize protein tyrosine kinase (Wee1) on the grounds that the specification did not provide a sufficient written description or an enabling disclosure for these variants. The Board reversed the Examiner on both rejections, noting that the specification provided the

polypeptide and polynucleotide sequence of the novel kinase and provided assays for screening for the activity of the protein. The Board stated that the analysis of the written description and enablement requirements "dovetailed" under these facts, and found that the guidance provided in the specification was sufficient to meet both requirements under U.S.C. § 112, first paragraph.

In *Ex parte Vogelstein*, the Examiner had rejected claims directed to methods that encompassed the use of fragments of the human p53 tumor suppressor gene on the grounds that it would require undue experimentation to generate functional fragments. The Board reversed this rejection, noting that the specification provided guidance regarding domains required for p53 function and methods for identifying functional p53 variants. Based on this guidance, the Board concluded that no undue experimentation would be required to make and test a series of deletion mutants of p53, and the claimed method met the requirements of U.S.C. § 112, first paragraph.

The present case meets the requirements of 35 U.S.C. § 112, first paragraph, as set forth by the Board in *Ex parte Sun* and *Ex parte Vogelstein*. The specification provides the sequence of the Pi2-like polynucleotide, guidance regarding the functional domains, and assays for choline binding activity and immunogenic activity. Accordingly, these claims meet the requirement for enablement under 35 U.S.C. § 112, first paragraph.

In support of the enablement rejection, the Office Action cites *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 18 USPQ2d 1016, 927 F.2d 1200 (Fed. Cir. 1991) and *Genentech, Inc. v. Novo Nordisk, A/S*, 42 USPQ2d 1001, 108 F.3d 1361 (Fed. Cir. 1997). These cases are being improperly applied to the present case for the following reasons.

In affirming the finding that the claims were not enabled, the *Amgen* court emphasized that 35 U.S.C. §112 "requires that the scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specification to persons of ordinary skill in the art." 18 USPQ2d at 1028, 927 F.2d at 1214. However, the court explicitly discussed that very different situations were presented where one of skill in the art would not be capable of making the claimed embodiment and a situation when one of skill in the art was capable of making the claimed embodiment. 18 USPQ2d at 1027, 927 F.2d at 1214. The court emphasized that in the case before it, "[a]fter five years of experimentation, ...'Amgen is still unable to specify which analogs have the biological properties...'" in the claim. 18 USPQ2d at 1027, 927 F.2d at 1213.

The *Genentech* decision echoed the *Amgen* decision. In *Genentech*, the Federal Circuit held that the asserted patent was invalid for lack of enablement. Again, the Federal Circuit examined the state of art at the time of filing-here, July 1979. The court stated the standard for enablement, noting that "[t]he question before us is whether the specification would have enabled a person having ordinary skill in the art at the time of filing to use cleavable fusion expression to make [human growth hormone] without undue experimentation." 42 USPQ2d at 1004, 108 F.3d at 1365.

Applicants note that while the standard for enablement has been stated similarly in opinions rendered over the past twenty years, the art has changed considerably during this time. Thus, in 1983, the Federal Circuit found a lack of enablement in *Amgen* where those of skill in the art could not clone genomic DNA using degenerate primers, a result that is not difficult to obtain today. Similarly, in 1979, enablement was not found in *Genentech* where those of skill in the art could not use cleavable fusion expression to produce human proteins, a technique that is now routine in the art. Thus, while the standard for enablement has not changed, enablement of recently-filed claims is supported by the enormous progress that has been made in molecular biology in the past 19-plus years. Accordingly, Applicants respectfully submit that the present specification provides ample support for one of skill to make and use the invention and therefore, the present claims are fully enabled.

In view of the evidence provided above, claims 1-21 are enabled, and the Examiner is respectfully requested to withdraw the rejection.

Written Description

Claims 1-21 were rejected under 35 U.S.C. §112, first paragraph, for lack of written description for claims 1, 6, and 12 parts (d) and (e) which are drawn to polynucleotide fragments encoding at least 40 amino acids and polynucleotides that hybridize under stringent conditions to the complement of the recited sequences, respectively. The Examiner asserts that sufficient written description does not exist as "Applicant has not described the composition and structure of all nucleic acid molecules encompassed by [claim 1, 6, 12 part (d) and (e)]" (Office Action mailed March 11, 2005, page 9, paragraph 3). This rejection is respectfully traversed.

First, every species encompassed by the claimed invention need not be disclosed in the specification to satisfy the written description requirement of 35 U.S.C. § 112, first paragraph. *Utter v. Hiraga*, 845 F.2d 993, 6 USPQ2d 1709 (Fed. Cir. 1988). The Federal Circuit has made it clear that sufficient written description requires simply the knowledge and level of skill in the art to permit one of skill to immediately envision the product claimed from the disclosure. *Purdue Pharm L.P. v. Faulding In.*, 230 F.3d 1320 1323, 596 USPQ2d 1481, 1483 (Fed. Cir. 2000) ("One skilled in the art must immediately discern the limitations at issue in the claims.").

The Examiner's attention is drawn to the "Guidelines for the Examination of Patent Applications Under the 35 U.S.C. 112, ¶1, ' Written Description' Requirement," which clearly state that "possession may be shown in many ways." 66 FR 1099, 1105. Applicants may satisfy the written description requirement by "disclosure of any combination of . . . identifying characteristics that distinguish the claimed invention from other materials and would lead one of skill in the art to the conclusion that the applicant was in possession" of the invention. 66 FR 1099, 1106. Factors relevant to a determination of possession of a claimed invention include:

> "the level of skill and knowledge in the art, partial structure, physical and/or chemical properties, *functional characteristics alone or coupled with known or disclosed correlation between structure and function, and the method of making the claimed invention.*" 66 FR 1099, 1106 (emphasis added).

Claims 1, 6, and 12 part (d) and (e), and their respective dependant claims, recite nucleotide sequences which encode at least 40 contiguous amino acids of SEQ ID NO:8 and nucleotide sequences which hybridize under stringent conditions to the complement of SEQ ID NO:7. The claims further recite that the recited polynucleotides have a defined function (i.e., confer disease resistance in a plant). The recitation of at least a fragment length or hybridization under defined conditions to a defined sequence provide *very specific and defined structural parameters* of the sequences encompassed by the claimed invention. The Examiner is reminded, that the description of a representative number of species does not require the description to be of such specificity that it would provide individual support for each species that the genus embraces. 66 Fed. Reg. 1099, 1106 (2000). Satisfactory disclosure of a "representative number" depends on whether one of skill in the art would recognize that the applicant was in possession

of the necessary common attributes or features of the elements possessed by the members of the genus in view of the species disclosed. 66 Fed. Reg. 1099, 1106 (2000). Applicant submits that the knowledge and level of skill in the art would allow a person of ordinary skill to envision the claimed invention.

Furthermore, the description of a claimed genus can be by structure, formula, chemical name, or physical properties. *See Ex parte Maizel*, 27 USPQ2d 1662, 1669 (B.P.A.I. 1992), *citing Amgen v. Chugai*, 927 F.2d 1200, 1206 (Fed. Cir. 1991). A genus of DNAs may therefore be described by means of a recitation of a representative number of DNAs, defined by nucleotide sequence, falling within the scope of the genus, *or* by means of a recitation of structural features common to the genus, which features constitute a substantial portion of the genus. *Regents of the University of California v. Eli Lilly & Co.*, 119 F.3d 1559, 1569 (Fed. Cir. 1997); *see also* Guidelines for Examination of Patent Applications Under the 35 U.S.C. 112, first paragraph, "Written Description" Requirement, 66 Fed. Reg. 1099, 1106 (2000). The recitation of a predictable structure of a defined fragment length and hybridization conditions is sufficient to satisfy the written description requirement.

An Applicant, however, may also rely upon functional characteristics in the description, provided there is a correlation between the function and structure of the claimed invention. *Id.*, *citing Lilly* at 1568. The claims further recite functional characteristics of the claimed genus. Specifically, claims 1, 6 and 12 part (d) and (e) recite that the claimed sequences further encode a polypeptide which can confer disease resistance in a plant; thereby providing a functional characterization of the sequences claimed in the genus.

Consequently, contrary to the Examiner's conclusion, the sequences encompassed by the genus claims of claims 1-21 are defined by relevant identifying physical and chemical properties. In summary, the description of a representative number of species *does not* require the description to be of such specificity that it would provide individual support for each species that the genus embraces. Applicants submit that the relevant identifying physical and chemical properties of the disclosed genus would be clearly recognized by one of skill in the art and consequently, the Applicant was in possession of the necessary common attributes or features of

the elements possessed by the members of the genus. Accordingly, the rejection of claims 1-21 under 35 U.S.C. §112, first paragraph, for lack of written description should be withdrawn.

The Rejection of the Claims Under 35 U.S.C. §102 Should Be Withdrawn

Claims 1-6, 8-12, and 14-21 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,274,789. This rejection is respectfully traversed. The Examiner concludes that given the broad interpretation of the term "stringent conditions," the DNA sequences disclosed in the '789 patent would inherently hybridize to the sequences recited in claims 1(e), 6(e), and 12(e). Claims 1, 6, and 12 have been amended to recite the specific hybridization conditions. The sequence set forth in the '789 patent will not hybridize under the stringent conditions recited in amended claims 1-6, 8-12, and 14-21, and the rejection of the claims under 35 U.S.C. §102 should be withdrawn.

Claims 1-21 are rejected under 35 U.S.C. §102 as being anticipated by U.S. Patent No. 5,677,175. This rejection is respectfully traversed. The Examiner concludes that given the broad interpretation of the term "stringent conditions," the DNA sequences disclosed in the '175 patent would inherently hybridize to the sequences recited in claims 1(e), 6(e), and 12(e). Claims 1-21 have been amended to recite the specific hybridization conditions. The sequence set forth in the '175 patent will not hybridize under the stringent conditions recited in amended claims 1-21, and the rejection of the claims under 35 U.S.C. §102 should be withdrawn.

CONCLUSIONS

In view of the foregoing amendments and remarks, Applicants respectfully submit that the rejection of claims 1-21 should be withdrawn. Accordingly, Applicants submit that this application is in condition for allowance. Early notice to this effect is solicited.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required

therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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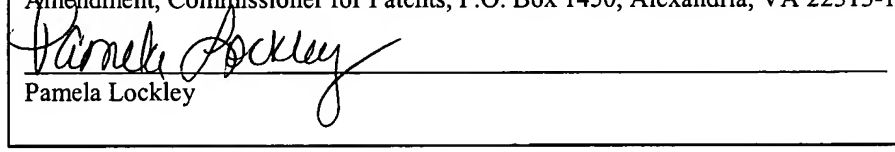

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